Adult Glycemic Management Policy Suite

Frequently Asked Questions

Alberta Health Services
Inspiring solutions. Together.

Diabetes, Obesity & Nutrition Strategic Clinical Network™

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Policy Information

Why were the provincial Glycemic Management policy and procedures for Hypoglycemia management and Hyperglycemia management developed?

These documents were developed to support improved glycemic management for adult patients in hospital, through the identification of strategies to help patients achieve their identified glucose targets in hospital.

Literature suggests that patients with diabetes experience hyperglycemia (high blood glucose) 38 per cent of the time they are in hospital. Hyperglycemia increases the risk of complications including: post-operative infections, pneumonia, diabetic ketoacidosis (DKA), and delayed wound healing. Improving blood glucose (BG) control in hospital has been associated with shorter length of stay in hospital and decreased rates of readmission. National Guidelines recommend BG targets of **5.0-10.0mmol/L** for most patients with diabetes in hospital.

The three documents aim to improve adult glycemic management in AHS acute care inpatient settings, through a series of coordinated strategies which include:

- establishing an acceptable BG targets for adults (5.0-10.0 mmol/L for most patients, see FAQ# 5 for exceptions)
- recommending BG testing regimens for adults in hospital
- identifying basal bolus insulin therapy as the most appropriate treatment regimen for adults requiring subcutaneous insulin
- supporting the safe management of insulin pump therapy in hospital when appropriate
- early recognition and treatment of hypoglycemic and hyperglycemic events
- supporting the review of hypoglycemic and hyperglycemic events so as to implement appropriate interventions to achieve recommended BG targets
- identifying the potential safety concerns of using home glucose monitoring devices and encouraging communication and education to prevent safety concerns.

Who created these governance documents?

These documents have been developed by a provincial multidisciplinary working group with Nursing, Pharmacy, Allied Health, Dietitian, Physician, Policy and Administration representatives from across five zones, and in consultation with Health Professions Strategy and Practice, College of Registered Nurses of Alberta (CRNA) and College of

Licensed Practical Nurses of Alberta (CLPNA). See Appendix A for working group membership.

Where can I learn more about the definitions used in the policy suite and governance documents?

AHS policy services (Insite) provides direction, framework and resources to develop provincial governance documents. You can reach out to policy@ahs.ca for more information.

I work for Covenant Health, do these resources apply me?

Yes, this resource and others listed on the provincial policy resource webpage are available to support the policy suite. Covenant Health employees and clinicians should refer to the Covenant Health governance documents for specific clinical guidance. AHS and Covenant Health clinicians and employees participated in the development of these documents.

Glycemic Management Policy Suite

Who does the policy suite apply to?

Adult in-patient settings in any Alberta Health Services (AHS) Acute Care setting, including Intensive Care Units, Emergency Departments, Urgent Care Centres, Day Wards, and Addiction and Mental Health inpatient settings.

These documents may also be used in non-acute care settings, however the site/unit managers are responsible for determining whether the governance documents in whole or in part are appropriate to their patient care setting and communicating that out to staff.

What are the blood glucose (BG) targets for adult patients in hospital?

Diabetes Canada Clinical Practice Guidelines recommends (BG) targets of **5.0-10.0mmol/L** for most hospitalized patients. These targets are higher and more liberal than the typical targets for patients with diabetes who are treated in the outpatient setting.

Higher values **5.0-12.0mmol/L** are acceptable for:

- The frail elderly and those with dementia: *an older adult and/or with dementia assessed as physically and/or cognitively frail at risk for confusion, agitation or falls.*
- Patients with limited life expectancy
- Patients at risk for severe hypoglycemia (e.g. hypoglycemia unawareness)

In critically ill patients the target BG range is **6.0-10.0mmol/L**. with the exception for those patients with acute coronary syndrome where their BG targets are 7.0-10.0mmol/L.

For patients with diabetes in pregnancy the target BG range is:

Antepartum:

- fasting and pre-prandial: 3.8 – 5.2 mmol/L; and
- one (1) hour post-prandial: below 7.8 mmol/L; and
- two (2) hour post prandial: below 6.7 mmol/L; or
- individualized targets determined by the MRHP.

During active labour:

- BG targets are 4.0 – 7.0 mmol/L.

For more information; please see Diabetes Canada Clinical Practice Guidelines, chapter 16

Why do health care professionals need to use the AHS POCT Blood Glucose (BG) meter?

The AHS Point of Care Testing (POCT) blood glucose (BG) meter (e.g. Roche Inform II) undergoes daily quality assurance. AHS staff receive education and training to remain competent in the use of the AHS approved BG meter(s). The AHS POCT BG meter device is approved by Health Canada for in hospital use and meets accreditation standards for POCT BG reporting.

There are many factors that may impact the accuracy of interstitial (sensor) readings and home BG meter test strips. Conditions common to the hospital population may affect sensor readings such as real time Continuous Glucose Monitor (rtCGM) or intermittently scanned Continuous Glucose Monitor (isCGM), rendering them inaccurate.

- Low blood pressure, poor tissue perfusion, hydration status, edema.
- Rapidly changing BG: interstitial fluid glucose levels may not accurately reflect BG levels leading to delayed detection of low or high BG.
- Interference from medications & substances (e.g., acetaminophen, heparin, salicylic acid, dopamine, uric acid, ascorbic acid, maltose, hydroxyurea and mannitol; tissue deposits).
- Strong magnetic or electromagnetic radiation e.g. an X-ray, MRI (Magnetic Resonance Imaging), or CT (Computed Tomography) scan is contraindicated. rtCGM and isCGM devices are to be removed prior to the appointment and a new sensor applied after the appointment.
- Sensor positioning (e.g. incorrect insertion, sensor falling out, application of pressure over sensor).

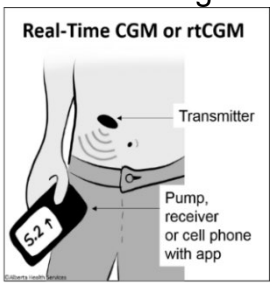
Home glucose monitoring technology is emerging and evolving to better support patients with diabetes in their glycemic management. Patients that want to continue the use of their home device in hospital, for their own information, should be encouraged to do so, however these results should not be used to make treatment decisions such as administration of insulin or treatment of hypoglycemia. Patient-reported self-monitored glucose values and trends from a home glucose monitoring device should be reviewed and discussed with the multidisciplinary health care team, in addition to the in-hospital POCT BG values, where appropriate.

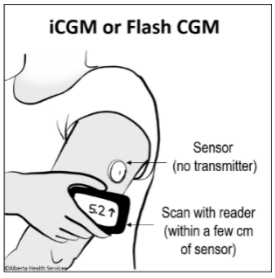
For sites using Connect Care, patients may share the glucose data obtained from their home device in a MyAHSConnect flowsheet during a hospital admission. To activate this functionality in MyAHSConnect, a prescriber must place a *MyChart IP Glucose Recording order*. Data documented in the MyAHSConnect flowsheet will automatically transfer to the Connect Care inpatient chart and is viewable on the Glucose Management Accordion Report, found in the summary activity. If the patient is unable to

record their values in MyAHSConnect themselves, the health care provider is able to document patient reported readings on the *Inpatient Vital Signs flowsheet* activity under Point of Care Tests → Patient Reported Glucose row, which appears once the *MyChart IP Glucose Recording* order is placed. Refer to the *Glycemic Management: Quick Start Guide* found on Insite or the Learning Home Dashboard.

What is the difference between a blood glucose (BG) meter and an interstitial glucose monitor?

A blood glucose meter, uses a small amount of capillary blood to provide a blood glucose result for the point in time collected.
A real time Continuous Glucose Meter (rtCGM) or intermittently scanned Continuous Glucose Meter (isCGM) provides an interstitial glucose result. These devices support patients living with diabetes in reviewing trends in glucose patterns (sensor glucose results) to better manage their day-to-day glycemic needs.

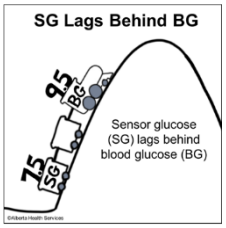




What is the difference between a blood glucose (BG) result and an interstitial glucose result?

A BG result is a measurement of the glucose in the blood vessel or capillary.
An interstitial glucose result is a measurement of glucose from the interstitial fluid. Interstitial fluid surrounds the cells of your tissue below your skin.

Typically, glucose moves from the blood vessels and capillaries first and then into interstitial fluid. A blood glucose and interstitial (or sensor) glucose result are rarely the same. A lag time may occur, especially when glucose values are changing quickly (e.g., after a meal is eaten or bolus of insulin administered). Blood glucose will rise and fall before an interstitial glucose. It is important to check a *blood glucose* before initiating treatment for hypoglycemia or hyperglycemia.



Is there a resource I can use to share information with patients about why AHS staff need to use the AHS blood glucose (BG) meter while patients are in hospital?

On MyHealth.Alberta.ca you can find the patient handout:
Checking your blood glucose (sugar) level while you're in the hospital (alberta.ca)
This resource is available on the Glycemic Management Policy Resource Page.
Glycemic Management Policy Suite | Alberta Health Services

Can my patient use their own lancing device to obtain a capillary blood glucose sample?

For patients/families who prefer to use their home lancing device to obtain a capillary blood (fingertip) sample, home lancing devices and lancets can be used if the patient can provide their own supplies and are able to change and dispose of their lancet independently. When AHS staff are collecting the blood sample, staff are required to use the Workplace Health & Safety (WHS) approved safety lancet. An order is not required for a patient to use their own lancing device.

My patient has refused blood glucose (BG) testing with the POCT AHS BG meter. Where do I document their reported glucose result?

The health care team needs to know the source of the glucose result (blood glucose or interstitial glucose). When documenting a patient reported glucose reading, both the patient reported glucose value and the type of device must be indicated on the blood glucose record and insulin administration record. This practice will vary dependent on if a site is using Connect Care, Sunrise Clinical Manager (SCM) or Paper Based Charting.

For sites using Connect Care, patients may share the glucose data obtained from their home device in a MyAHSConnect flowsheet during a hospital admission. To activate this functionality in MyAHSConnect, a prescriber must place a *MyChart IP Glucose Recording order*. Data documented in the MyAHSConnect flowsheet will automatically transfer to the Connect Care inpatient chart and is viewable on the Glucose Management Accordion Report, found in the summary activity. If the patient is unable to record their values in MyAHSConnect themselves, the health care provider is able to document patient reported readings on the *Inpatient Vital Signs flowsheet* activity under Point of Care Tests → Patient Reported Glucose row, which appears once the *MyChart IP Glucose Recording* order is placed. Refer to the *Glycemic Management: Quick Start Guide* found on Insite or the Learning Home Dashboard.

For Connect Care Sites, what do I scan to ensure the AHS BG meter result is accurately uploaded to the patient's chart?

Scan the **barcode** on the patient's wrist band, for more information see the Connect Care tip sheet *Patient Wristband Scanning*.

When should blood glucose (BG) testing occur?

Timing of Testing

- BG levels are to be tested four times daily, before each meal and before bedtime.
- Test BG if any suspicion of hypoglycemia
- Ideally, testing needs to happen within 30 minutes of the patient's meal. Meal delivery times are unit specific.
- Patients that are fasting, have a continuous tube feed, or parenteral nutrition (PN) require testing at usual scheduled meal times and bedtime, or every 6 hours.
- When the patient will be off Unit at a location where BG testing is not readily available, and/or the patient will be engaging in physical activity, the BG should be tested before the patient leaves the unit.

When should blood glucose (BG) test be repeated?

- When the result is inconsistent with patient's clinical status; or
- suspected equipment malfunctioning including expired test strips or visible changes to the test strip.

What is the recommended timing of insulin administration?

Coordination of blood glucose (BG) Testing and Insulin Administration
Both the BG test and insulin administration are to be coordinated with meal delivery and occur 15-30 minutes before the meal.

- Short acting insulin is given 30 minutes prior to mealtime
- Rapid acting insulin is given no more than 15 minutes prior to mealtime

Exception: meal/bolus insulin may be given immediately **after** the meal/feed in certain situations (e.g., gastroparesis or concern that the patient may not be able to ingest or retain the full meal).

What is Basal Bolus Insulin Therapy (BBIT)?

Basal Bolus Insulin Therapy (BBIT) is a way of ordering multiple daily injections of subcutaneous (sc) insulin that better replicates how our body naturally produces insulin. Basal Bolus Insulin therapy allows clinicians to customize insulin regimes based on the unique needs of each patient. It is a proactive approach to managing blood glucose (BG) values and aims to anticipate a patient's insulin needs. A BBIT regime can minimize the risk of having high and low BG levels in hospital. Less fluctuation in BG values is better for the patient and the patient feels much better. BBIT has been shown to be an effective way to manage patients' diabetes during their hospital stay, and is more similar to how patients manage their diabetes in the community.

BBIT includes 3 components: basal insulin (long acting), bolus (short acting or meal-time) insulin, and correction insulin.

Basal Insulin - covers the glucose the liver (and to a lesser extent the kidneys) makes around the clock

Bolus insulin - covers the meal time carbohydrates

Insulin Correction - corrects the patient's BG back into target range if it is high

Titrate - Every patient is different! The BG is checked regularly and insulin doses adjusted every 1-3 days!

For more information; please visit the BBIT website at: www.bbit.ca

What is meal insulin?

Meal/bolus insulin is given to cover the meal time carbohydrates (the rise in blood glucose from eating). This is rapid or short acting insulin given prior to meals.

When should insulin be held?

The meal/bolus insulin dose should be held if the patient is not receiving nutritional intake, NPO or fasting for a test or procedure. (The basal insulin should be administered as prescribed, as well as the correction insulin if required, as per orders.)
If there is a change in the patient's oral intake (increased nausea and vomiting or decreased appetite), the prescriber needs to be contacted, as the insulin dose may or may not need to be adjusted.

Where do I find the guidelines for Safe Management of Insulin Pump Therapy (IPT) in hospital?

The guidelines for safe management of IPT in Hospital can be found at www.ipumpit.ca.These guidelines support patients to self-manage with their insulin pumps when safe and appropriate. They also support the safe transition to another insulin regimen when patients are unable to self-manage using their insulin pump.

Key Message of guidelines-"*If pump stopped, must replace basal insulin* ***within 2 hours*** *to prevent Diabetic Ketoacidosis (DKA)"*

Hypoglycemia Procedure

Who does the Hypoglycemia procedure apply to?

Treatment is for all appropriate patients with a blood glucose less than four (4.0) mmol/L, even those asymptomatic who meet the criteria below:

a) Patients with diabetes or gestational diabetes, who are on at least one of the following medications: insulin or insulin secretagogues (e.g., glyburide, gliclazide, glimepiride or repaglinide).
b) Patients without diabetes who have symptomatic hypoglycemia due to insulin or insulin secretagogue overdose (e.g., glyburide, gliclazide, glimepiride or repaglinide), malnutrition, liver failure, or more rare conditions (e.g. insulinoma, late dumping syndrome, etc.)

This hypoglycemia protocol should **not** be applied to:

a) patients with diabetes who are not taking insulin or insulin secretagogues (e.g., glyburide, gliclazide, glimepiride or repaglinide).
b) asymptomatic patients who do not have diabetes (since healthy people who are fasting can have blood glucose levels below four (4.0) mmol/L)

Should the meal/bolus insulin be held if the patient's pre-meal blood glucose (BG) is less than 4.0mmol/L?

When the patient experiences hypoglycemia before a meal, the hypoglycemia should be treated (according to the hypoglycemia procedure) until their BG is greater than 4.0 mmol/L. The patient should then receive their meal insulin if they are eating their meal.

When should 15 grams carbohydrate be given orally to a patient?

- When blood glucose (BG) is less than 4.0mmol/L **and** the patient is considered appropriate for this procedure, see FAQ #19
- For patients requiring thickened fluids; provide thickened juice based on the thickness indicated in the patient's diet order.
- Patients on acarbose (Glucobay): **only** dextrose (glucose) tabs or honey may be used as the medication delays the absorption of sucrose.

*Patients who are NPO or have an altered level of consciousness should not receive the carbohydrate by mouth.

What are some examples of 15 grams of carbohydrate that can be given orally?

- 4 dextrose (glucose) tablets* (16 g of carbohydrate); or
- three-quarter (3/4) cup or 175 mL of juice or regular pop; or
- 1 and ½ individual packages (or 15 mL or 18 g of carbohydrate) of honey ; or
- 4 packets of sugar (white or brown), dissolved in water.

*Dextrose (glucose) tablets are the **preferred treatment** for hypoglycemia. Other options may not be readily available in AHS facilities, as this is unit and site dependent.

*Dextrose (glucose) tablets are the preferred treatment for hypoglycemia in patients who have had bariatric surgery. Due to anatomical changes of bariatric surgery other treatment options may not be tolerated.

*Dextrose (glucose) tablets may be crushed and dissolved in water.

When a conscious patient has a Tube Feed, how do I treat the hypoglycemia?

If the patient has a tube feed and unable to have nutritional intake by mouth, provide 4 dextrose (glucose) tablets crushed and dissolved in water via tube feed **AND** flush with 30mL water (pre and post treatment).

Juice, pop and honey are not acceptable treatment options as they may cause clogging or damage to the tube.

If the patient is NPO or has an altered level of consciousness, follow the treatment recommendations outlined in the AHS procedure treatment of hypoglycemia.

The food or menu item recommended in the procedure is not available on my unit or not appropriate for the patient, where do I find information on alternate/ replacement food menu items?

If none of the recommended options are available or appropriate for the patient, discuss the best options with the Dietitian.

What is a schedule 1 medication?

A Schedule 1 medication is a medication that requires a prescription or order from an authorized prescriber. Controlled drugs and substances are included in Schedule 1. For information on medication schedules please see the Scheduled Drugs Regulation under the Pharmacy and Drug Act (2000).

Can Nurses (RN, RPN, LPN) give D50W without a prescriber's order?

In emergent situations where it is not possible to obtain an order prior to initiating a protocol, contacting the MRHP can happen at the same time as the protocol and interventions within it are being implemented. Confirm the dose of the medication with MRHP before administration, when possible.

D50W IV direct is a schedule 1 medication, a medication that requires an order or prescription. Refer to the dextrose product monograph in the provincial parenteral manual for more information.

CRNA Medication Guideline 10: *Nurses must have a client specific order from an authorized prescriber in order to implement a **protocol** that includes the administering of Schedule 1 medications within the named protocol.*

CLPNA Medication Guideline Protocols: *A **protocol** is an organizationally-approved guide for practice that is to be implemented by health care professionals managing specific client health needs in their practice environment.*

Emergent situations are defined (in the CRNA document) as circumstances that call for immediate action or attention such that a delay in treatment would place an individual at risk of serious harm.

What if Nurses on our unit are not competent and confident to administer IV direct medications?

If the nurse or most responsible health care practitioner treating the patient who is experiencing hypoglycemia with an altered level of consciousness is not competent and confident to provide IV direct medication, IV D50W shall be administered in a minibag (following the D50W monograph) as per the procedure and algorithm.

Why is a large vein required for the administration of D50W?

IV D50W is a hyperosmolar solution. It should only be administered IV direct via a large vein (e.g., antecubital). Administered into a small vein, it can cause extravasation and consequential complications including tissue injury and loss of limb.

Can I give D50W IV after I administer glucagon (SC or IM) if an IV is established or do I wait for 15 minutes?

Glucagon is to be administered in the patient that is unable to swallow or has an altered level of consciousness, **when IV access is not available**. Once IV access is established, D50W IV is to be administered as D50W action time is significantly quicker than glucagon.

The BG will be re-assessed 15 minutes after the D50W is administered.

Where can I find information on how to mix and administer glucagon?

Instructions for mixing glucagon can be found in the box (instruction insert) as well as on the parenteral monograph- glucagon

What do I do for patients with a blood glucose (BG) between 4.0 - 5.0mmol/L?

The target BG for most hospitalized patients with diabetes is 5.0-10.0mmol/L.

Treatment of hypoglycemia is initiated when the BG is less than 4.0mmol/L.

A BG between 4.0-5.0 mmol/L in the hospital setting does not require intervention **unless the patient is symptomatic of hypoglycemia**. If the patient is experiencing symptoms of hypoglycemia the hypoglycemia procedure is to be followed.

A patient with a BG between 4.0-5.0 mmol/L, should be assessed for symptoms of hypoglycemia prior to being sent off the unit for a test, procedure, physical activity, etc., and communication between departments should occur.

Frequent BG values between 4.0-5.0mmol/L with symptoms of hypoglycemia may require titration of medications for diabetes management.

Why shouldn't the patient be sent off the unit when their blood glucose (BG) is less than 4.0mmol/L?

When the BG is less than 4.0mmol/L, the patient may feel unwell.

Symptoms of hypoglycemia include: Excessive hunger, Irritability, Tachycardia, Mood changes, Diaphoresis, Tiredness, Tremors/trembling, Inability to concentrate, Headache, Confusion, Nausea

When patients take insulin or oral insulin secretagogues (e.g., glyburide, gliclazide, glimepiride or repaglinide), these medications will continue to lower blood glucose values if not treated appropriately. If a low BG is not treated the patient can develop an altered level of consciousness or have convulsions.

What is the rationale for re-assessing the blood glucose (BG) 1 hour after treatment of hypoglycemia?

Reassessing a BG level 1 hour after initial treatment is a safety measure. It is recognized that recurrent hypoglycemia may impair the patient's ability to sense subsequent hypoglycemia.

The hypoglycemia procedure is very lengthy. How can Nurses respond in a timely manner in a crisis situation?

This 11-page governance document is summarized in a 2-page algorithm, which is included as an appendix.
To support staff education there is an AHS video for Treatment of Hypoglycemia: https://www.youtube.com/watch?v=yn835BAJshg&feature=youtu.be

Hyperglycemia Procedure

Why shouldn't the patient with Type 1 Diabetes be sent off the unit if their blood glucose (BG) is greater than 18.0mmol/L and they are positive for ketones?

When BG levels are significantly elevated the patient may feel unwell. BG levels will continue to rise if untreated. High BG can put the patient at risk for the development of Diabetic Ketoacidosis (DKA) which is a medical emergency for patients with diabetes.

What is Diabetic Ketoacidosis (DKA), and why are patients at risk for DKA?

Diabetic Ketoacidosis (DKA) is a diabetes emergency. It is caused by a deficiency of insulin in patients with Type 1 diabetes (autoimmune) or Type 3c (pancreatectomy, etc.) and those with Type 2 diabetes that are insulin deficient. The ensuing hyperglycemia results in a combination of osmotic diuresis (urinary water loss) and electrolyte abnormalities with resultant dehydration. Insulin deficiency and elevated glucagon levels lead to the breakdown of fat, producing ketones/acids. Ketones are an alternate energy source used when glucose is not available. High levels of ketones can lead to a life threatening condition known as Diabetic Ketoacidosis (DKA).

The clinical presentation of DKA includes symptoms of hyperglycemia (see above), nausea, vomiting and abdominal pain, Kussmaul respiration (deep/laboured), acetone-odoured breath (sweet/fruity breath) and ECFV (extra cellular fluid volume) contraction (dehydration). There also may be a decreased level of consciousness. DKA is associated with significant morbidity and mortality and so should be prevented whenever possible.

How are ketones tested?

The patient's urine or blood serum can be tested for ketones. If patient has Type 1 diabetes and blood glucose is greater than 18.0mmol/L, stat ketone testing is recommended (to be ordered by the most responsible health practitioner). Available method of ketone testing varies across acute care sites and will be site dependent. (Exception: Stat ketone testing recommended if BG greater than 14.0mmol/l for patients on insulin pump therapy or on SGLT2 inhibitors).

What are SGLT2 inhibitor medications?

SGLT2 inhibitors (Sodium–glucose co-transporter 2 inhibitors) are oral medications to decrease blood glucose levels by increasing the amount of glucose passed through the urine.

The following medications are SGLT2 inhibitors: canagliflozin (Invokana®)*, dapagliflozin (Forxiga®), empagliflozin (Jardiance®)*

a. **Are SGLT2 inhibitors on the AHS formulary?**
   SGLT2i medications with a * are formulary restricted medications. The other SGLT2i medications are non formulary.
b. **Are there any special considerations with SGLT2 inhibitors?**
   These agents may cause euglycemic DKA; in some cases DKA has occurred in patients with normal or modestly elevated blood glucose. These medications may be held by the most responsible health practitioner prior to events that may predispose the patient to DKA. See the AHS SPN Atypical Presentation of Diabetic Ketoacidosis with Sodium Glucose Co-transporter 2 Inhibitors (albertahealthservices.ca) for more information.

Where can nurses find a quick reference for treatment & management of hyperglycemia?

See algorithm attached to the hyperglycemia procedure.

General Information

What is the difference between Type 1 and Type 2 diabetes?

Type 1 Diabetes Mellitus (T1DM)
T1DM is caused by destruction of the insulin producing beta cells in the Islets of Langerhans, most commonly from an autoimmune process. The pancreas therefore produces very little or no insulin, so blood glucose (BG) rises (hyperglycemia). If the body cannot use glucose as an energy source, because of a lack of insulin, it breaks down fat and produces ketones, which are acidic. High levels of ketones can lead to a life threatening condition known as Diabetic Ketoacidosis (DKA).

People with T1DM need insulin therapy to survive, typically a basal bolus insulin regimen (may also be referred to as multiple daily injections). They tend to be less insulin resistant (require lower total daily doses [TDD] of insulin) and have a higher risk of developing severe hypoglycemia (the beta cells can no longer work in conjunction with the alpha cells that produce Glucagon).

People who live with T1DM are taught to carefully monitor their diet (carbohydrate intake), exercise and BG levels, and to administer insulin to help manage their BG levels at home.

Type 2 Diabetes Mellitus (T2DM)
T2DM is a progressive chronic disease, with varying degrees of insulin resistance and insulin deficiency. The pancreas produces some insulin, but the cells in the body fail to respond to the insulin properly (insulin resistance). The pancreas often cannot produce enough insulin to overcome this resistance without treatment. However, the pancreas is usually still able to make glucagon in response to insulin production, lowering the risk of severe hypoglycemia.

Initially when individuals are diagnosed with T2DM, diet and exercise lifestyle modifications are an important part of their long term treatment. There are now many medications (oral, non-insulin injections and insulin) to help treat T2DM. Some medications reduce insulin resistance, others increase insulin production, others reduce glucagon and still others increase glucose loss in the urine. People living with T2DM for a long period of time will often need supplemental insulin therapy.

Summary:
Type 1 Diabetes (T1 DM
- Autoimmune in nature; the pancreas produces very little to no insulin
- These patients always require basal insulin
- At risk for Diabetic Ketoacidosis (DKA)

- At significant risk for Hypoglycemia

Type 2 Diabetes (T2 DM)

- A combination of insulin resistance and insulin deficiency
- The pancreas produces some insulin, but the body is resistant to its own insulin production
- Most patents will benefit from insulin supplementation in hospital

For more information; please visit Diabetes Canada

In what aspects are the management of Type 1 and Type 2 diabetes similar?

The management of T1DM or T2DM in the hospital can be similar if a patient requires insulin to manage their blood glucose levels. A patient with T1DM will ALWAYS require insulin. A patient with T2DM may benefit from insulin in the hospital. When subcutaneous insulin is ordered and administered in the hospital, basal bolus insulin therapy (BBIT) is the recommended best practice as it closely mimics how the body naturally produces insulin.

Where can I find additional resources supporting improved glycemic management in hospital?

a. Glycemic Management Policy Resource Page:
   - Video for Hypoglycemia management education
   - Recorded Webinar
   - Patient handout: Checking your blood glucose (sugar) level while you're in the hospital (alberta.ca)

b. Insite: Insulin Safety and Diabetes Management
   - Insulin Safety & Diabetes Management
   - Search insulin or diabetes

c. My Learning Link
   - Search "Basic Diabetes" for an interactive learning module on basic diabetes education, with a focus on in-hospital diabetes management.

d. Safer Practice Notices:
   - Safer Practice Notice- Safety Concerns regarding us of Home Glucose Monitoring Devices in Acute Care (albertahealthservices.ca)
   - Safer Practice Notice updated-safe use of insulin pens (albertahealthservices.ca)
   - Safer Practice Notice - ensuring safe use of insulin pens and demonstration devices during patient education (albertahealthservices.ca)
   - Safer Practice Notice - Safe Insulin Pump Therapy in Acute Care (albertahealthservices.ca)

- Safer Practice Notice - Atypical Presentation of Diabetic Ketoacidosis with Sodium Glucose Co-transporter 2 Inhibitors (albertahealthservices.ca)

e. www.bbit.ca
   - PowerPoint presentations
   - Self-directed learning module
   - Posters
   - Pocket cards

f. www.ipumpit.ca
   - Guidelines for Safe Management of Insulin Pump Therapy in hospital

2021 Revision Highlights

What are the updates to the policy and procedures in June 2021?

The following is a brief summary of the elements in the 3 governance documents that were revised, and the rationale for these revisions.

Glycemic Management Policy (Adult HCS-206)
Glycemic Management Policy Suite added references to provincial resources such as developed Clinical Knowledge Topics and Guidelines related to acute care glycemic management. Elements 1.2d, 3.7b, 3.8, 3.9a, 3.9c

1.2 **NEW ELEMENT –** *based on recommendations from provincial SPN working group to the provincial glycemic management policy working group*
Health care professionals shall perform blood glucose **point-of-care testing (POCT)** with the AHS blood glucose meter to determine:
- a) administration of medication doses;
- b) adjustment of insulin doses and/or other diabetes medication(s); and
- c) the treatment for hypoglycemia.
- d) Patient refusal of POCT with the AHS blood glucose meter shall be documented as per the AHS *Consent to Treatment/Procedure(s)* Policy.
  - (i) Patients who refuse POCT with an AHS blood glucose meter should be provided with education regarding safety concerns associated with use of home glucose monitors during a hospital admission. Refer to the patient handout *Checking your blood glucose (sugar) level while you're in the hospital* (MyHealth.Alberta.ca*)*

1.3 **NEW ELEMENT -** *based on recommendations from provincial SPN working group to the provincial glycemic management policy working group*
Patients may continue to use their home glucose monitors for personal record retention.
- a) If the patient chooses to use their own home glucose monitoring device, the values should <u>not</u> be used to determine:
  - (i) administration of medication doses;
  - (ii) adjustment of insulin doses and/or other diabetes medication(s); or
  - (iii) the treatment for hypoglycemia.
- b) Home glucose monitors include personal blood glucose meters (BGM), real time continuous glucose monitors (rtCGM), and intermittently scanned continuous glucose monitors (isCGM).
  - (i) rtCGM and isCGM devices measure the glucose levels found in the interstitial fluid; results may not be the same as capillary or lab blood glucose results.
- c) An **order** is required from the **most responsible health practitioner (MRHP)** for an exception, upon review with the health care team (including specialty consultation) and with the patient/family.

(i) Patient-reported self-monitored glucose values and trends from a home glucose monitoring device should be reviewed and discussed with the multidisciplinary health care team, in addition to the in-hospital POCT blood glucose values, where appropriate.

2.2 **NEW ELEMENT –** *targets added to align with the recommendations in the provincial diabetes in pregnancy order set*

For women with diabetes in pregnancy, the blood glucose target range is:

a) Antepartum:
   (i) fasting and pre-prandial: 3.8 – 5.2 mmol/L; and
   (ii) one (1) hour post-prandial: below 7.8 mmol/L; and
   (iii) two (2) hour post prandial: below 6.7 mmol/L; or
   (iv) individualized targets determined by the MRHP.
b) During active labour, targets are 4.0 – 7.0 mmol/L.

Procedure for Hypoglycemia (***Adult HCS-206-01)***

- 1.2 & 1.3 Align wording and language in policy element 3.8 for continuity and to provide clarity.
- 4.4 d Provided amount of carbohydrate per package to be consistent with other options

Procedure for Hyperglycemia (HCS-206-02)

- 1.5 Formatting changes to support continuity and ease of reading to provide clarity.
- 4.2 e Addition of provincial resource as a reference
- 4.4 Addition of provincial resource as a reference

Resources and References:

Alberta Health Services Resources:

1.2 Diabetic Ketoacidosis, Adult – Emergency Department (DKA, Diabetes, Hyperglycemia, Hyperglycemic Hyperosmolar State) Clinical Knowledge Topic
1.3 Diabetic Ketoacidosis, Adult – Inpatient Clinical Knowledge Topic
1.4 Basal Bolus Insulin Therapy, Adult - Inpatient (BBIT) (ahsnet.ca) - Clinical Knowledge Topic
1.5 Guidelines for the Safe Management of Insulin Pump Therapy in Hospital
1.6 Insulin Safety and Diabetes Management (Insite- search insulin or diabetes)
1.7 AHS BBIT website (www.bbit.ca)
1.8 AHS IPUMPIT website (www.ipumpit.ca)
1.9 Treatment of Hypoglycemia in hospital Video: Treatment of Hypoglycemia

Non-Alberta Health Services Documents:

2.1 Checking your blood glucose (sugar) level while you're in the hospital. Patient Handout https://myhealth.alberta.ca/Alberta/Pages/blood-glucose-hospital.aspx
2.2 Medication Guidelines 2019 (College and Association of Registered Nurses of Alberta [CARNA])
2.3 Medication Guidelines 2018 (College of Licensed Practical Nurses of Alberta [CLPNA])
2.4 Diabetes Canada Clinical Practice Guidelines Expert Committee. Diabetes Canada 2018 Clinical Practice Guidelines for the Prevention and Management of Diabetes in Canada. Can J Diabetes. 2018;42(Suppl 1):S1-S325.
2.5 Umpierrez GE, Smiley D, Zisman A, et al. Randomized Study of Basal-Bolus Insulin Therapy in the Inpatient Management of Patients with Type 2 Diabetes. Diabetes Care. 2007; 30:2181-2186.
2.6 Galloway, J. A., R. E. Chance, K. S. E. Su: Human insulin and it's modifications. In The Clinical Pharmacology of Biotechnology Products. Reidenberg M. M., ed. Amsterdam, Elsevier (1991), pp. 23-34
2.7 White JR, Campbell RK, Hirsch I. Postgraduate Medicine. June 2003; 113(6): 30-36

Appendix A: Adult Glycemic Management Policy Working Group

Name		Role	Site/Department	Zone
Leta Philp	Co-Chair	Practice Lead	DON SCN	Provincial
Suzanne Snozyk	Co-Chair	Manager	APL POCT	Provincial
Krystle Heikkinen	Co-Chair	Policy Advisor	Policy	Provincial
Linda Juse		Senior Practice Consultant	HPSP	Provincial
Sasha Wiens		Clinic Coordinator	DCC- Inpatient DM	Calgary Urban
Chantelle Smook		CNE	QEII Hospital	NZ
Chauntal Dunn		RD	NLRH	NZ
Madie Anderson		CNE - Acute Inpatient	Alberta Hospital	EZ
Rae Popowich		CNE- Cardiac Sciences	RAH	EZ
Ifeyinwa Ezeuko		Inpatient Diabetes	UAH/KEC	EZ
Cassie Waters		CNE - Learning Services	UAH/KEC	EZ
Rhonda Roedler		Practice Leader	Pharmacy	Provincial (South)
Sheila Hill		Head Nurse	RDRH	CeZ
Leanne Haines Doig		Practice Lead- Rural	Rural	CeZ
Reema Gerlitz		CNE-Addictions & Mental Health	CRH	SZ
Michele Ritchot/Linda Vogel		CNE	CRH	SZ
Dawn Kingham		CNE	Integrated Quality Management	EZ
Brenda Ashman		Director	Medicine	SZ
Brian Zarsky		Clinical Safety Leader	Patient Safety	CalZone
Stacey Lowrie		CNE	Day Surgery/FMC	CalZone
Jenn Watson		CNE	Unit 37 FMC (Renal)	CalZone
Lisa Jackson		CNE	Unit 74 GIM RGH	CalZone
Shyann Rogan		CNE	PLC	CalZone
Ad Hoc Membership				
Dr. Julie McKeen	Medical Advisor	Endocrinologist	Division of Endocrinology	Calgary
Dr. Tammy McNab	Medical Advisor	Endocrinologist	Division of Endocrinology	Edmonton
Dr. Mike O'Connor/ Dr. Heather Paul	Medical Advisor	Pathologist	APL	South/Provincial

Kim Young		RD	Nutrition Food Services	Provincial
Isabelle Emery		Patient Advisor		
Bev Madrick		Patient Advisor		
Janet Nielsen		RD	Nutrition Food Services	Provincial
Danielle Denty		CNE- surgery	NLRH	NZ
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